

CHAPTER 6. Disease Prevention, Control, and Management

6.1. Introduction

National disease prevention and control programs are important to prevent, or control and mitigate the spread of, aquatic animal infections with PAADs or RAADs in the United States. This chapter discusses disease prevention, control, and management from the national perspective, including programs that could be developed by the Federal government, and incorporates recommendations from working groups and stakeholders. Topics include biosecurity, site selection and fallowing, the Federal response to the finding of PAADs and RAADs, and zonation as a tool for disease management.

6.2. Biosecurity

Biosecurity¹ is the protection from transmission of infectious diseases, parasites and pests among and between animals and pathogen sources. Biosecurity measures are implemented to prevent the introduction or mitigate the spread of pathogens to protect a resource or industry. Proper biosecurity is fundamental to disease containment. Biosecurity embodies all of the measures that should be taken to exclude or reduce disease transmission.

Biosecurity plans are designed to mitigate risk factors for pathogen spread by both direct and indirect pathogen transmission. Direct pathogen transmission is mitigated by controlling contact with an infected animal or its products, such as blood, secretions, excretions, and vectors. Indirect pathogen transmission is mitigated by controlling animal contact with contaminated feed, water, fomites, people, or animals that are contaminated but not infected or susceptible to disease expression.

Elements of biosecurity plans include cleaning and disinfection protocols; control of movement of people, animals, vehicles and equipment; quarantine of new and returning animals; controlling effluent discharges; evaluation of the effectiveness of the biosecurity plan; monitoring of potential vectors and reservoirs; and treatment and/or exclusion of disease vectors and reservoirs. Biosecurity plans address these general areas, but are tailored based on the pathogen and the animals it affects.

The following concepts were developed with stakeholder input and are considered fundamental parts of a biosecurity plan. However, it is understood that these concepts are inherently commodity and facility specific, and aquatic disease programs should work with stakeholders to develop biosecurity measures for future Federal programs.

6.2.1 Plans

Biosecurity as it relates to aquaculture production is a broad topic. Specific plans will vary significantly among commodities, and may vary among pathogens. It is not the intent to summarize all of the biosecurity measures necessary for reportable pathogen

exclusion. Rather it is to emphasize that progressive improvements of biosecurity measures are fundamental to the success of U.S. aquaculture industries, and that every facility should have a biosecurity plan in place.

6.2.2 Morbidity and mortality data

Monitoring, recording, and analyzing of morbidity and mortality data are fundamental to effective biosecurity.

6.2.3 Sanitation and disinfection

6.2.3.1 Animals and products

Much research has been conducted on salmonid egg disinfection with iodophor (PVP-polyvinylpyrrolidone-buffered iodine) to reduce the associated pathogen load, but this process may not be appropriate for other commodities or life stages. Regardless of the specific processes, the proper sanitation and disinfection of animals and products is a primary step in preventing the introduction of pathogens into a facility.

6.2.3.2 Equipment

Typical disinfectants and dosages recommended for aquaculture equipment have been well established and successfully used in various aquaculture commodity groups for years. These disinfection procedures are employed to reduce or eliminate pathogens from equipment and other potential fomites and vectors, including diving gear and boats. While not recommending these standards as appropriate for all commodity groups, common disinfectants and dosages² are:

- Chlorine (20 mg/l active ingredient for ten minutes)
- Iodophor (100 mg/l active ingredient for ten minutes)
- Quaternary ammonium compounds (1200 mg/l active ingredient for ten minutes)
- Virkon S³ (1% solution)

6.2.3.3 Personnel

Facility personnel are the key to the success of site health management plans, particularly sanitation and disinfection procedures. Personnel movements around a facility can rapidly and efficiently transmit pathogens. Sanitation and disinfection procedures for personnel will depend on the commodity, facility infrastructure, and disease status of the animals.

6.2.3.4 Fallowing

Fallowing is the process by which aquatic animal premises are kept vacant for a period of time for the control and management of aquatic animal pathogens. The period of time will vary according to the pathogens being managed and the

environmental conditions at the aquaculture site. The fallowing period commences after the rearing site has been de-populated of aquatic animals. Typically, after depopulation (including harvest), all equipment, nets, and gear are cleaned so as to remove potential pathogen reservoirs and fomites. The intent of fallowing is to decrease the numbers of pathogens in the surrounding environment, to the extent that the risk of infection will be reduced when aquatic animals are reintroduced into the rearing site. The success of fallowing relies on the decrease of pathogens in the environment by natural mortality, the absence of carrier animals or fomites re-entering the area during fallowing, and the pathogen-free status of the animals used to restock the site.

There is no standard optimal fallowing period for all commodities and pathogens. Recommended fallowing periods will vary considerably. Fallowing periods should be of adequate length such that there is a reasonable scientific expectation that the reservoir of organisms will be significantly reduced in a manner that reduces the occurrence or re-occurrence of a disease of concern.

6.4. Federal response to the finding of a PAAD or RAAD

The purpose of this section is to generally describe what actions should be taken in the event of finding a PAAD or RAAD in the United States. However, reporting procedures are only part of the overall Federal Government response to the finding of a PAAD or RAAD. A general overview of recommended Federal Government actions and responses will be presented here.

Following the input from stakeholders during working group meetings, the list of suggested RAADs and PAADs were developed and are listed in Chapter 4. The Task Force will eventually consider developing programs for these pathogens. Appropriate management could consist of Federal-State-Tribal cooperative programs, testing and certification programs, import requirements and other programs.

While prevention is the key to avoiding the introduction of exotic or virulent aquatic animal pathogens via biosecurity and surveillance programs, an effective response must be swift, collaborative, and comprehensive. Such a timely action is rarely achieved if a contingency plan is not in place. This chapter will recommend general contingency plans and associated actions if a PAAD is found. Commodity-specific recommendations and contingency plans could be developed in future response documents and surveillance plans as the NAAHP evolves.

Initial responses by the Federal government to RAADs and PAADs should follow the Incident Command System (ICS) and engage local or regional management and authorities as much as possible. The ICS structure provides a consistent nationwide management system, or template, to enable all government, private sector, and nongovernmental organizations to work together during domestic incidents. ICS always works under five major sections: Command, Operations, Planning, Logistics, and, Finance/Administration.

The following section outlines ways that the Federal competent authorities can improve their structures and abilities to respond to RAADs and PAADs.

6.4.1 Administration

The legal authorities granting authority over aquatic animal health in the United States were described in detail in chapter 3. Under this construct, it is recommended that each individual agency establish or strengthen its respective aquatic animal health infrastructure, working closely with the other Federal, State, Tribal, and private entities, to be able to prepare for and respond to future PAAD findings.

Activities associated with the finding of a PAAD should be supervised by the Federal agency with primary regulatory authority over the actions to be taken on the affected aquatic animals, which should be considered the lead agency for that response. Regardless of the lead Federal agency for a particular response, the APHIS CVO will continue to be the contact point for reporting OIE reportable pathogens to the OIE, as described in chapter 5.

Upon receiving notification of a suspected or confirmed RAAD or PAAD, and in the interest of clarifying and verifying potentially conflicting information from multiple sources, the Task Force technical representatives (TR) for APHIS, FWS, and NOAA Fisheries should serve as contacts to forward pertinent information within their respective agencies and to other Federal, State, Tribal, industry, academic, and other stakeholders. Delegation of authority and duties of a TR to another individual should be communicated in advance to the other TRs so as to maintain continuous and reliable Federal interagency communication. This channeling of information through the TRs is intended to facilitate correct information dissemination, not to impede communication. However, these established communications channels should not discourage stakeholder contact at all levels when necessary.

TRs are responsible for ensuring a coordinated response. As such, the implementation of agency contingency plans related to PAADs and RAADs should be the responsibility of the Federal TR.

6.4.2 Identification and Confirmation

Finding of a PAAD or RAAD may be considered a serious health event and may invoke regulatory actions. Therefore, rapid and accurate pathogen identification and confirmation is necessary to avoid regulatory actions based on incorrect or premature information.

Once a lead Federal agency for the PAAD response has been identified, it is the responsibility of the lead TRs to orchestrate the steps needed to confirm suspicion. As a PAAD event is, by definition, a Federal response, the lead Federal agency should expect

logistical, and, if necessary, personnel support to rapidly acquire the necessary diagnostic samples for pathogen identification and confirmation.

Once a suspected pathogen that causes a PAAD has been detected, its identity should be immediately confirmed by a reference or other appropriate laboratory. This confirmation by a reference laboratory is necessary because a positive finding may invoke regulatory actions and reporting to the OIE with possible subsequent trade implications.

6.4.3 Biosecurity Responses

Perhaps the most important lesson learned from previous reportable disease incidents, whether caused by terrestrial or aquatic pathogens, is the need to act quickly and decisively when these pathogens are first observed. The first observation of a pathogen in a population may occur in concert with routine surveillance in clinically healthy fish, but often it results from investigations of disease events. Once detected, though, it is possible that pathogen dissemination may be limited if control efforts have been planned.

Biosecurity efforts within an aquaculture facility can be divided into three parts: preventing pathogens from entering a facility, preventing pathogens from moving within a facility, and preventing pathogens from moving out of a facility. Ideally, biosecurity protocols are sufficient to prevent PAAD incursions, but if a pathogen that causes a PAAD enters a facility or there is the suspicion of a PAAD, biosecurity contingency plans should be enacted to prevent the spread of the pathogen. The difficulty is finding the balance between allowing business and trade operations to continue while awaiting pathogen confirmation and implementing strict biosecurity measures that prevent any business and trade operations to continue. This balance will need to be addressed on a case-by-case basis as events arise, and rapid decisions based on qualitative risks to national, regional, and local aquatic animal resources.

6.4.4 Control Measures

Federal responses to a PAAD will vary according to the pathogen in question and the facility, zone, or location of the incident. Specific programs will need to be developed in conjunction with industry, States, tribes and relevant stakeholders.

6.4.5 Communication and public awareness

Communication regarding PAAD events is important to both the facility or industry affected and the general public. To facilitate this communication, the co-competent Federal agencies should prepare fact sheets in advance. These fact sheets would include information regarding the pathogen name(s), signs of the disease, reasons for seriousness, risks to human health, and contact points for further information. This may alleviate personnel time related to general public requests for information about the disease.

Because Federal regulatory actions may have negative economic impacts on a facility or industry, it is recommended the potentially affected individuals and industries are

informed and understand Federal actions. It is difficult and frustrating for industry to conduct business if potential regulatory actions are unknown. Therefore, commodity- and pathogen-specific response and surveillance plans, developed with industry and stakeholder input, should include recommendations for Federal responses.

6.4.6 Postevent evaluation and ongoing surveillance

Following a PAAD event, the lead Federal co-competent authority of the particular event should conduct an evaluation of the implementation of the PAAD plan, effectiveness of the measures taken, and actions to be taken, including ongoing surveillance. The evaluation of the implementation and effectiveness of the lead Federal co-competent authority's actions should be transparent and open to input from all Federal, State, local and Tribal governments, industry, and stakeholders. The intent of this evaluation is to improve future implementation of other PAAD plans and Federal actions.

1. A. David Scarfe, Lee, Cheng-Sheng, O'Bryen, P.J. 2006. Aquaculture Biosecurity. Prevention, Control, and Eradication of Aquatic Animal Disease. Blackwell Publishing, Ames, IA. 182 pp.
2. Wedemyer, G.A., ed. 2001. Fish Hatchery Management, 2nd edition. American Fisheries Society; Bethesda, Maryland.
3. <http://www.antecint.co.uk/MAIN/virkonvi.htm>